CLAIMS

1. A method for adapting a linear systems to a set of observations with a Least Square Solver (LESS) having adaptation parameters with complex-valued elements, comprising the steps of::

transforming said adaptation parameters from a complex arithmetic to two sets of real number arithmetic by means of binary orthogonalization transformation (BOT),

computing with LESS said two sets of real number arithmetic; and

transforming after said computing with LESS said two sets of real number computation to complex number arithmetic using an inverse binary orthogonalization transform (IBOT).

2. The method as described in claim 1, wherein said computing of said two sets of real number arithmetic are applied in parallel.

3. The method as described in claim 1, wherein said computing of said two sets of real number computation LESS are applied in series.

4. The method as described in claim 1, wherein the LESS represents a Recursive Least Squares algorithm (RLS).

6. The method as described in claim 1, wherein the LESS represents a Least Mean Squares (LMS) algorithm.

7. The method as described in claim 1, wherein said LESS is a Householder transformation.

8. The method as described in claim 1, wherein said LESS is a Cholesky decomposition.

9. The method as described in claim 1, wherein said LESS is a Singular Value Decomposition (SVD).

10. The method as described in claim 1, wherein said LESS is a QR Decomposition (QRD).

11. The method as Claim 4, wherein the RLS is computed by a systolic array.

12. The method as described in claim 1, wherein the LESS represents the group consisting of a Block Matched Filter Estimator (BMFE), a Block Zero Forcing Estimator (BZFE), and a Block Minimum Mean Square Error Estimator (BMMSEE).

13. The method as described in Claim 11, wherein the group is computed through the group consisting of a Cholesky decomposition, a singular value deposition (SVD) and a QR Decomposition (QRD).

14. The method as described in claim 1, wherein said LESS is constrained as CLESS in that an initial BOT from complex number arithmetic to real number arithmetic is used; then two real

computation CLESS are applied, each one producing P output streams; and finally a corresponding number of P IBOT modules from real number arithmetic to complex number arithmetic are implemented.

15. The method as described in claim 1, wherein said linear system is applied for the group consisting of temporal, spatial, joint temporal and spatial channel estimation.

16. The method as described in claim 1, wherein said linear system is applied for the group consisting of temporal, spatial, joint temporal and spatial channel equalization.

17. The method as described in claim 1, wherein said linear system is applied for the group consisting of carrier frequency estimation, Direction of Arrival (DOA) estimation, and joint carrier frequency and DOA estimation.

18. The method as described in claim 1, wherein said linear system is an adaptive filter.

19. An apparatus for implementing Least Square Solver (LESS) to adapt a linear system to a set of adaptation parameters, whose elements are complex-valued, comprising:

binary orthogonalization transformation means to transform said elements from complex arithmetic to real number arithmetic;

LESS means to compute said real number arithmetic; and

inverse binary orthogonalization transformation means to transform said real number arithmetic to another complex number arithmetic.